

SUPERPRIMERS: CHROMATE-FREE, LOW-VOC SYSTEMS ELIMINATING CHROMATE CONVERSION COATINGS

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Chromate-based technology has been used by the coating industry for around forty years for mitigating the corrosion problem in metals and alloys. A typical chromate-based technology setup for a coating comprises of a chromate conversion coating step, which is followed by the application of a primer and a subsequent topcoat. The primer contains pigments which are chromate-based like strontium chromate and barium chromate. This has been schematically shown in Figure 1a. However, the EPA of the US has identified chromates as carcinogenic and toxic. As such, a world wide effort is ongoing for a replacement technology that can provide an equal corrosion protection and is environmentally compatible.

Van Ooij et al. have extensively studied the potential of using simple rinses with dilute organofunctional silane solutions to replace the chromate conversion coating step of the chromate-based coating technology in the past. When tailored and modified with additives like cerium salts these treatments were found to demonstrate excellent corrosion protection properties comparable with chromate conversion coatings and provided excellent adhesion to a variety of topcoats.

Environmental hazards associated with VOC compounds used as solvents in the coatings. High molecular weight polymeric resins can provide excellent corrosion resistance. However, they are typically formulated as primers using a VOC solvent. Low molecular weight compounds can be water formulated however they have inferior anticorrosion properties. The SUPERPRIMERS have been engineered with low/zero-VOC compounds. As such these systems are water-borne and yet provide excellent corrosion resistance.

In the current study we have demonstrated that when a resin is combined with a organofunctional silane to formulate a primer we can produce a coating which :

- Obviates the need for a conversion coating like chromate conversion coating and phosphate
- Offers far superior corrosion protection performance as compared to simple primers formulated with just the resins
- Is low-VOC and therefore environmentally friendly
- Can be used on a wide range of substrates like aluminum aerospace alloys, HDG, CRS, concrete, plastics etc.

Some typical characteristic properties of our coating systems will be discussed in this poster. We will also demonstrate that it is possible to have a large number of systems based on the choice of resin and that these primers Figure 1b. schematically represents the SUPERPRIMER system.

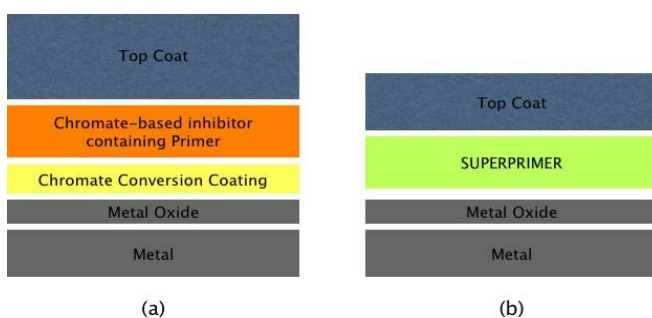


Figure 1 (a) Chromate-based system (b) SUPERPRIMER-based system for corrosion protection of metals and alloys